REMARKS

Claims 37-46 are pending in the present Application. Claims 1-36 have been withdrawn, claims 37 and 38 have been amended, and claim 40 has been cancelled, leaving claims 37-39 and 41-46 for consideration upon entry of the present Amendment.

Claims 37 and 38 have been amended to incorporate the limitations of claim 40, and claim 40 has been cancelled. No new matter has been introduced by these amendments.

An unsigned Declaration with attachments is submitted herewith. A signed copy will be forwarded upon receipt.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

The Invention and Claims

Independent claim 37 of the present application claims a filler formed by drying a sol comprising a specific form of silica, followed by heat treating the silica to form at least one crystalline phase therein. In an important feature of this invention, the silica particles in the sol are nanoscale particles in the form of chains. Figures 1 and 2 show the chain forms of the silica particles.

Figure 1

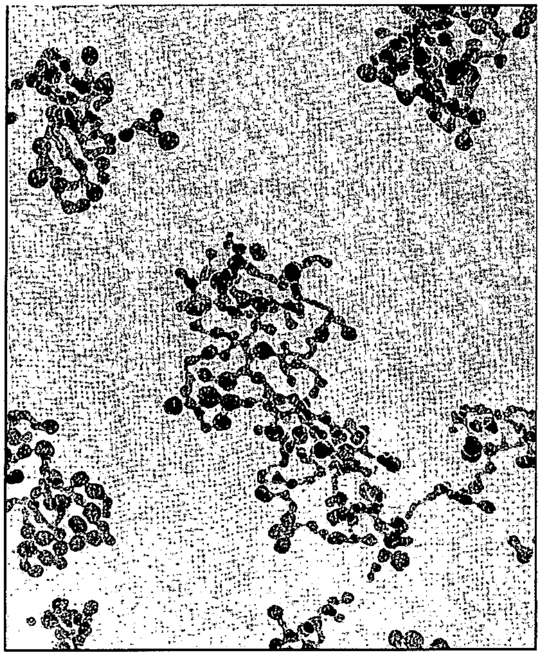
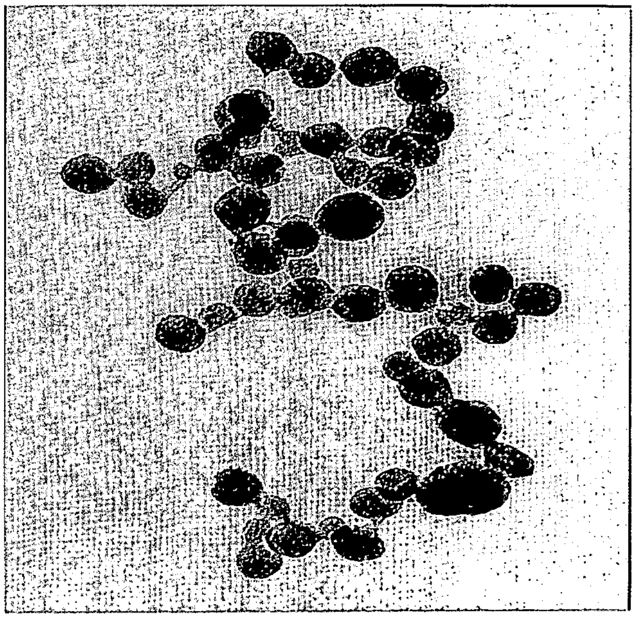


Figure 2



(See Declaration of Dr. Weitao Jia, which accompanies this amendment, para. 3). In the silica sol illustrated by these Figures, the individual silica particles having a diameter of about 1 to about 50 nanometers are associated into chains that have a length of about 5 to about 400 nanometers. The fillers formed in this process, and set forth in claims 37-39 and 41-46, are in this form.

In order to better define the filler, and clarify the differences between the claimed filler and the art, the claims have been amended to reflect that the individual silica particles have a diameter of about 1 to about 50 nanometers, and the chains of particles have a length of about 5 to about 400 nanometers.

Claim Rejections Under 35 U.S.C. § 102(b) and § 103

Claim 37 stands rejected under 35 U.S.C. § 102(b), as allegedly anticipated by JP 360004561 A ("JP '561). Claim 37 further stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over JP '561. Applicants respectfully traverse this rejection.

JP '561 teaches a dental filler formed by treating the surface of an inorganic oxide composed mainly of silica and one or more metallic oxides with an organic silicon compound. JP '561 discloses that the particles are spherical, but does not disclose that the particles are in the forms of chains. In order to support an anticipation rejection based on inherency, an Examiner must provide factual and technical grounds establishing that the inherent feature necessarily flows from the teachings of the prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Int. 1990); *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981) (holding that inherency must flow as a necessary conclusion from the prior art, not simply a possible one). Here, mere disclosure of spherical silica particles is insufficient to establish that the particles are in the form of chains. As set forth in paragraph 5 of the Declaration, the form of silica derived from a sol is determined by a variety of factors. One of ordinary skill in the art would have no reason to believe that the formation of chains necessarily flows from the disclosure in JP '561. Further, in the absence of any disclosure of silica in the form of chains in JP '561, or any suggestion to even try different structural forms of silica in JP '561, the formation and use of such form is not obvious over JP '561.

Finally, JP '561 discloses that the spherical particles have a diameter of 0.1-1.0 micrometer (i.e., 100-1,000 nanometers). In contrast, the claimed silica particles have much smaller diameters - about 1 to about 50 nanometers. The term "about" in these claims does not encompass a value that is twice the highest value recited, and a value that is twice the highest claimed is not obvious. JP '561 accordingly does not render the present claims anticipated or obvious.

Claims 37-43 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,544,359 (Waknine).

Waknine is directed to subjecting a filler for a dental restorative material to a series of milling steps. When used in a dental restorative material, the dental restorative material can further comprise a relatively small amount, i.e., from about 1-5% by weight, of a colloidal fumed silica. According to the Examiner, "Waknine teaches the silica particles are colloidal and thus would inherently form chains. Due to the particle size of the silica, the chains would inherently exhibit the claimed length." Office Action, p. 2.

Applicants respectfully traverse this rejection, on the basis that a colloidal fumed silica as disclosed by Waknine does not inherently form chains. The Examiner has provided no factual or technical grounds establishing that the inherent feature necessarily flows from the teachings of the prior art. The fact that "colloidal" silica is disclosed merely means that the silica at some point was present in the form of a colloid; it says nothing regarding the form or structure of particles in the colloid. As stated by Tabatabaei et al., "Depending on the synthesis process parameters, the structure of colloidal particles may vary . . ." (Declaration, para. 4.) Finally, as set forth in the Declaration at paragraph 5, fumed silica is not present in the form of chains. Figure 3 is a TEM image of colloidal fumed silica. No chains are present.

Since a chain form does not necessarily flow from use a disclosure of colloidal fumed silica, Waknine does not anticipate claims 37-39 and 41-46 of the instant application. Further, in the absence of any disclosure of silica in the form of chains in Waknine, or any suggestion to even try different structural forms of silica in Waknine, the formation and use of such form is not obvious over Waknine.

Claims 37-39 and 43-46 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,764,497 (Yuasa). Claims 37-46 further stand rejected under 35 U.S.C. § 103(a), as allegedly obvious over Yuasa. Applicants respectfully traverse this rejection.

Yuasa describes inorganic particles in the form of substantially non-agglomerated spheres derived from a sol-gel process. (Col. 3, lines 40-46; Abstract). There is no disclosure that the spheres form chains. As stated at paragraph 5 of the Declaration attached hereto, one of ordinary skill in the art would know that chain structure of the silica derived from a sol such as the SNOWTEX®-PS silica sol is not necessarily found in all silicas derived from a sol gel. Such structure is therefore not inherent in the fillers of Yuasa. This lack of inherency is underscored by the Figures in Yuasa, which, according to the specification at column 3, lines 40-46, show substantially non-agglomerated spheres. No chains like those of Figures 1 and 2 of the Declaration are seen in the Figures of Yuasa. Yuasa therefore does not anticipate the claims of the instant application. Furthermore, in the absence of any disclosure of silica in the form of chains in Yuasa, or any suggestion to even try different structural forms of silica in Yuasa, the formation and use of such form is not obvious over Yuasa.

Finally, the particle size of the inorganic particles in Yuasa is in the range of from 0.1 to 1.0 micrometers (i.e., 100-1,000 nanometers). In contrast, the claimed silica particles have much smaller diameters - about 1 to about 50 nanometers. and a value that is twice the highest claimed is not obvious. Yuasa therefore does not anticipate or render obvious claims 37-39 and 41-46 of the instant application.

Claims 37-39 and 43 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 6,387,981 (Zhang). Applicants respectfully traverse this rejection.

Zhang is directed to a dental material comprising a hardenable resin, heavy metal oxide particles, and non-heavy metal oxide particles, preferably silica particles. There is no disclosure in Zhang that the fillers described therein are in the form of chains. Figure 1 of Zhang, which shows the claimed silica/non-metal oxide disclosed and claimed therein, show shapeless aggregates, not chains. Regarding the silica particles, Zhang states in the specification that:

> The silica particles may be aggregated, where the aggregate comprises a plurality of smaller sized silicas particles; however, it is still desirable and preferable that the total aggregate size be less than about 300 nm, more preferable less than about 200 nm.

(Col. 5, lines 38-43.) There is nothing in this disclosure that mandates or even suggests that when aggregated, the silica aggregates are in the form of chains. Indeed, the disclosure of Zhang further states that preferred silicas include fumed silicas. As set forth in paragraph 5 of the Declaration, fumed silicas are not inherently in the form of chains. If the silicas if Zhang can include fumed silicas, and fumed silicas are not inherently in the form of chains, then the silicas of Zhang cannot inherently be in the form of chains. Furthermore, in the absence of any disclosure of silica in the form of chains in Zhang, or any suggestion to even try different structural forms of silica in Zhang, the formation and use of such form is not obvious over Zhang.

Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 37-43 stand rejected under 35 U.S.C. § 103(a), as allegedly obvious over U.S. Patent No. 3,066,112 (Bowen). Bowen discloses a dental filling material comprising fused silica. As stated in paragraph 6 of the Declaration, grinding the particles of the fused silica, even to nanometer size, does not result in formation of silica chains as shown in Figures 1 and 2 of the Declaration. Thus, Bowen in no way teaches or suggests that the silica is in the form of chains, let alone chains having a length of about 5 to about 400 nanometers.

It is also well known in the art that fused silica is defined as amorphous silica. See, e.g, Hawley's Condensed Chemical Dictionary for a definition of fused silica. (Declaration, para. 6.) Thus, in contrast to the present application, the fused silica described in Bowen does not contain a crystalline phase.

There is no motivation in Bowen or the art to specifically select these parameters to obtain the claimed material. In the absence of any teaching by Bowen to use silica in the form of chains, or silica having at least one crystalline phase, the present claims are not obvious over Bowen.

Claims 44-46 further stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Bowen, Waknine, or Zhang in view of U.S. Patent No. 4,180,911 (Bullock). It is believed that independent claim 38, from which claims 44-46 depend, are novel and non-obvious over each of Bowen, Waknine, and Zhang for the reasons set forth above. Bullock fails to remedy these deficiencies, as it fails teach or suggest that the silica is in the form of chains, and has at least one crystalline phase. Reconsideration and withdrawal of this rejection are therefore respectfully requested.

Provisional Nonstatutory Double Patenting over Claims of Copending Patent No. 6,417,246

Claims 37-40 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 3 and 7 of U.S. Application No. 6.417,246 of Jia et al. Applicants will submit a terminal disclaimer in compliance with 37 CFR § 1.321(c) to overcome the rejection upon a notice of the allowability of the claims.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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